

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2004/013097

International filing date (day/month/year)
18.11.2004

Priority date (day/month/year)
05.12.2003

International Patent Classification (IPC) or both national classification and IPC
B22F3/105

Applicant
M.B.N. SRL

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2004/013097

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or
Industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	4,5,8,9,12,13,15,20,21,22,23,26
	No: Claims	1-3,6-7,10,11,14,16,17,18,19,24,25,27-30
Inventive step (IS)	Yes: Claims	
	No: Claims	1-30
Industrial applicability (IA)	Yes: Claims	1-30
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43bis.1 and 70.10)

and /or

2. Non-written disclosures (Rules 43bis.1 and 70.9)

see form 210

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

size, the laser irradiance and the deposition velocity. In addition it would be obvious for the person skilled in the art to set the diameter of the laser spot diameter larger than the diameter of the major component in weight in order to come to a direct deposition and sintering effect.

Similarly and independently of D1, does D2 disclose a method and apparatus (see figure 1) for direct material deposition by means of laser energy input. Although D2 treats the specific problem of applying "reflective" material in combination with "absorptive" material w.r.t. electromagnetic energy, the teachings of D2 are in general aimed at improving the energy efficiency of the deposition process.

On analysing the energy imparted on the powder particles by means of the laser beam on the basis of formula II (see page 11, top), it is clear for the person skilled in the art that the width of the laser beam (w_0) should be adjusted in relation to the radius of the particle (r_p), preferably of approximately the same size. On the other hand, it can be derived from formula I (see page 10, line 25) that the width of the laser beam should not be too small in order not to impart the deposition velocity and the time of flight of the particle too much.

The particle diameters considered in D2 (page 9, lines 5-13) are in the range of 5-400 μ m, preferably 20-150 μ m. It is stated that with finer particles the energy requirement are decreased and the resolution is increased. The material can be fed in under different forms, including aerosol (see page 7, line 27).

Hence, on the basis of the teachings of D1, D2 respectively, the person skilled in the art would inevitably arrive at the same result as of claim 1.

Hence, the subject-matter of claim 1 is considered to be not novel and as a consequence, also not inventive.

3 INDEPENDENT CLAIM 14 (APPARECCHIATURA 1° TIPO)

- 3.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 14 is not new in the sense of Article 33(2) PCT.

The technical features of claim 14 (i.e the rigid target area, means for generating the powdery stream, means for generating a heating flux, a device formed by 1st and 2nd

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)

International application No.

PCT/EP2004/013097

? The subject-matter of claim 6 (see D1, figure 11 ; D2, page 8, lines 13-14) and 10 (see D1, column 11, line 3 ; D2, page 1, line 11) is known from either of D1 or D2. The subject matter of claim 7 is known from D2, see page 6, lines 24-25. The subject matter of claim 18 is known from D4 (see figures 3, 5 and 8). The subject matter of claims 19, 24, 27-29 has been disclosed in D1, see figures 6 and 11 and column 16, line 31 - column 19, line 3.

not inventive :

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The subject-matter of claim 4 is known from D6 for use in laser sintering applications. The person skilled in the art faced with the problem of improving the resolution of high-precision parts, would combine the teachings of D6 with those of either D1 or D2 to arrive at the solution as presented in claim 4 without having to demonstrate inventive skill. The choice of the corresponding width of the heating flux would be obvious based on the same reasoning as given for claim 1 (see also Item VIII). The subject-matter of claim 5 is one of several straightforward alternatives to produce the fine particles ; the person skilled in the art would choose one in accordance with circumstances without involvement of inventive skill. No unexpected technical effect is derivable from choosing this option.

The subject-matter of claim 8 is an arbitrary value, from which no unexpected technical effect is derivable. The person skilled in the art would know, depending on the other process parameters (see also D2, formula I and II) at which speed level to operate.

The subject matter of claims 9, 25 and 26 can not be considered as involving an inventive step, since it would be obvious for a person skilled in the art to eliminate oxygen from the process chamber in order to allow for a controlled conduction of the process.

The subject-matter of claims 12, 20 and 21 only brings about an alternative for the laser energy source ; these alternatives do not bring about an unexpected technical effect and are merely a list of several straightforward alternatives, from which the person skilled in the art would choose without applying inventive skill.

Claim 13 merely states a possible aftertreatment, which the person skilled in the art would consider when faced with the problem of porosity.

The subject-matter of claim 15 has been disclosed in D5, see figure 1 and page 7, lines 12-29. For a person skilled in the art seeking for a solution to adjust the size of the feed channels it would be obvious to combine the nozzle of D5 with the teachings

X MI SEMBRA CHE LE PARTICELLE CONSIDERATE IN D6 SIANO IN MEDIA DI DIMENSIONI MOLTO MASSORI DI QUELLE DELL'INVENZIONE

- 1.1 The expressions "so that", "with the result that" (claim 1) and "in order to" (claim 29) relate to a result to be achieved without clearly stating the process step required to arrive at the envisaged result. According to the PCT Guidelines (ISPE/1, published 11/03/2004), Part II, Chapter 5, §5.35, this wording is not allowable in view of Art. 6 PCT.

Furthermore, there seems to be a conflict between the interpretation of these expressions in claim 1 and the limit with respect to the width of the heating flux in claim 4.

Namely, according to page 7, lines 27-28, - in simplified wording - the particles size ("A") should not exceed the width of the laser beam ("B"), in other words : $A \leq B$. According to the example given on page 7, lines 30-31, it is stated that the laser beam ("B") should not exceed the (upper) particle size ("A"), i.o.w. $B \leq A$. In the case that A and B are equal (i.e. $20\mu\text{m}$) this does not lead to a contradiction, in all other cases it does, especially with the additional information that the laser beam width should not exceed $150\mu\text{m}$ (page 7, line 34). Hence, the formulation of claim 4 is not supported by the description and is in contradiction with the information given in claim 1.

- 1.2 It is clear from the description on page 2, lines 8-11, and page 4, lines 3-6, that the features of the particle size (90% in weight of the powder in between 0.5 and $20\mu\text{m}$) and its corresponding laser beam width are essential to the definition of the invention in order to obtain the high-precision parts which are aimed for.

Since independent claim 1 does not contain this feature it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

- 1.3 The expressions "such as" (claim 12), "preferably" (claim 15, 24, 25, 27) and "for example" (claim 28) have no limiting effect on the scope of a claim, in other words the features that follow these expressions are entirely optional (see also PCT Guidelines (ISPE/1, published 11/03/2004), Part II, Chapter 5, §5.40).